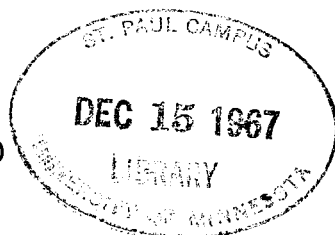


AGRONOMY NO. 1042

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Safflower -- An Oilseed Crop For Minnesota?

Safflower is the leading new crop of the past 20 years. Commercial acreage increased to 25,000 in 1949 and to half a million in 1963. Processing plants have been erected and the crop's future appears favorable in the Southwestern United States.

History

In 1925, safflower testing began in the Great Plains States. The seed was found too low in oil to interest oilseed processors. Later, the Nebraska Agricultural Experiment Station developed varieties of about 35 percent oil compared to older varieties of less than 30 percent.

Commercial production became centered in western Nebraska and eastern Colorado, but has now spread to most western states. Since 1950 California has led the nation in safflower production. Over 40,000 acres were grown in western North Dakota in 1961. Nebraska acreage reached a high of 86,000 in 1962, but decreased to 3,000 in 1966 with a 5-year average yield of 342 pounds per acre.

The University of Minnesota Department of Agronomy and Plant Genetics, testing safflower from 1950 to 1953, and 1963 to 1966, found it to be less profitable than commonly grown field crops. Varieties included in 1950-1953 trials were N-3 (spineless), N-5, N-6, N-8, and N-852 (see table). The Gila variety safflower was tested from 1963 to 1966 and this variety may be responsible for the relatively high oil content at Crookston from 1963-1966. In recent years, a few farmers in western Minnesota raised safflower.

Plant Growth

Safflower, an annual, belongs to the same plant family as sunflowers and thistles. Each seed produces a central stem. However, the stem does not elongate for several weeks so leaves develop near the ground in a rosette--like a young thistle plant.

This slow growth in early spring frequently results in a weedy crop. The stem elongates to about 2½ feet in Minnesota. The stem branches to form many heads in contrast to the single head of cultivated sunflowers. Stiff spines develop on leaf margins of most varieties at about bud stage and make it painful to walk through a field.

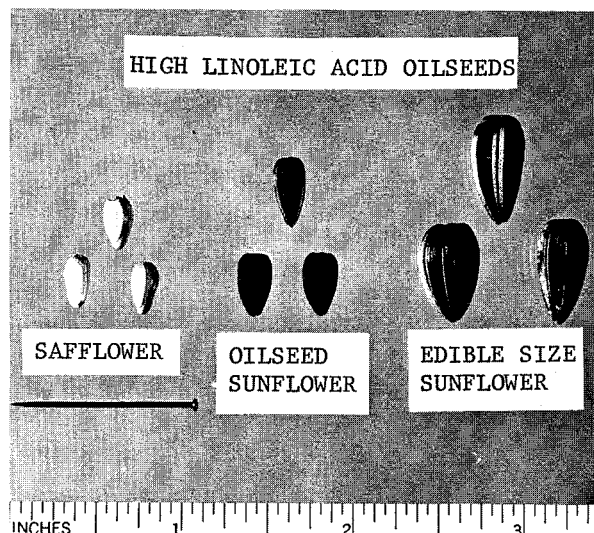


Table 1. Safflower performance in Minnesota.
Yield and oil content of the best variety in each spacing in each trial.

Location	Year	Row spacing inches	Seed yield per acre pounds	Oil content* percent
Crookston	1950-52	42	378	16.1
	1950-52	6	544	18.5
	1963-66	6	545	33.9
Southwestern Minnesota	1950-52	40	474	22.4
	1950-52	6	451	20.7
Morris	1950	42	331	8.1
	1950	6	286	13.5
Waseca	1966	6	1,248	--
Anoka (sand)	1953	40	42	--
St. Francis (sand)	1953	40	0	--
Grand Rapids (sand)	1963	36	5	--

*Low because of poorly filled seeds.

The heads, about 1 inch in diameter, contain many flowers. Flowering begins in late July and seed matures in September. Not all flowers produce seed, but several to many seeds are produced in each head. The seeds are enclosed by the head in similar fashion to thistle seeds, rather than being exposed like sunflower seeds. This characteristic prevents shattering before harvest and somewhat delays bird feeding.

Uses and Products

Safflower is grown primarily for the oil--about 35 percent of the seed. As an industrial oil, it is considered a drying or semidrying oil with an iodine value of about 145. It is used in paints and other surface coatings. The oil is light in color and has no after-yellowing properties so is adapted to white and light colored paints.

As an edible oil, safflower oil contains nearly 75 percent linoleic acid--considerably higher than corn, soybean, cottonseed, peanut, or olive oils. Researchers disagree on whether oils high in polyunsaturates, like linoleic acid, help decrease blood cholesterol and related heart and circulatory troubles. Nevertheless, publicity on this matter made safflower an important crop and vegetable oil.

Safflower meal remaining after oil extraction is a protein supplement for livestock. Most meal available is whole, pressed seed meal containing hulls which were originally over 40 percent of the seed. This meal contains about 20 percent protein and much fiber. Decorticated meal (many hulls removed) approaches 40 percent protein content and is medium in fiber content.

Safflower seed is a good livestock feed, but present prices are too high to warrant its use. However, the bird feed industry purchases a limited amount of seed. Sheep and cattle graze succulent safflower and stubble fields after harvest.

The historic use of safflower over the centuries was production of flowers to be used as red and yellow dyes for clothing and food.

Marketing

Safflower is generally grown under contract. A grower buys seed from the contracting firm and agrees to sell his entire production for a certain price per ton (\$70 to \$80 per ton during recent years delivered although the price did reach \$100 per ton for a short time). The nearest processing mill is in Nebraska.

Growing the Crop

Low seed yield and lack of local markets make safflower an economically questionable crop for production in Minnesota. However, it may be grown using these production practices:

Seed should be treated with a fungicide.

Safflower is sown about 1 inch deep with a grain drill at a rate of about 30 pounds per acre. (A starting point in calibrating a grain drill for

30 pounds of safflower per acre is a drill setting of 3 pecks of wheat.) The crop can also be planted in cultivated rows 20 to 40 inches apart at rates of about 15 to 25 pounds per acre.

Trials to determine the best planting time in Minnesota have not been made. The crop has been planted as early as April 17 and as late as June 29. April or early May plantings are probably best, but very late plantings reduce weed problems. The crop requires about 4 months to mature.

Weeds frequently emerge before safflower and these weeds can be killed by spike tooth harrowing. If weed germination is delayed and safflower is about 3 inches high when weeds are emerging, the spike tooth harrow, coil spring harrow, rotary hoe, or weeder can be used to uproot small weeds.

Herbicide trials on safflower haven't been conducted in Minnesota. Diallate (Avadex) is sold for preplanting application and barban (Carbyne) for early postemergence application to control wild oats in safflower fields. EPTC (Eptam) and trifluralin (Treflan) are sold for preplanting application to safflower fields for general weed control. Amiben is approved for preemergence application, but is restricted to use on seed crops only.

Lambast at $\frac{1}{2}$ pound per acre is approved for postemergence application in North Dakota, Montana, and California. 2, 4-D kills safflower.

Safflower is an excellent crop for combine harvest; it stands well and doesn't shatter easily. It should be combined, standing like soybeans, but this may necessitate artificial drying or waiting until green weeds are killed by freezing. Moisture content of safflower seed shouldn't exceed 8 percent for longtime storage. The crop can be windrowed to dry out green weeds when seed moisture content is as high as 25 percent.

The combine cylinder speed must be low, less than 800 r.p.m., to prevent cracking seed. Concave clearance should be about one-half inch. Adjust wind speed to blow out empty seed but not filled seed.

Varieties now grown include N-10, Pacific-1, U.S.-10, Gila, Pacific-7, and Ute.

A Minnesota Crop?

The safflower plant grows well on good farm soils in Minnesota. However, the atmospheric humidity-temperature balance in late summer frequently causes seeds not to fill. As a result, what looks like a good crop is sometimes empty hulls. In spring and early summer, safflower is a poor weed competitor. These factors and the lack of local markets make safflower a poor crop choice.

Minnesota farmers and processors desiring to cash in on the demand for linoleic acid edible oils should consider sunflower which is an adapted crop in Minnesota. (See Extension Bulletin 299, The Sunflower Crop in Minnesota.)

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